

REMARKS

Claims 11-19 and 21-31 are pending in this application. By this Amendment, claim 11 is amended and claim 20 is canceled. Claim 11 is amended to incorporate the subject matter of dependent claim 20. No new matter is added.

I. Rejections Under 35 U.S.C. §§102(b) and 103(a)

The Office Action rejects claims 11, 13 and 26 under 35 U.S.C. §102(b) as allegedly being anticipated by Watanabe et al. (J. Org. Chem. 2002, 67, 1712-1715), (hereinafter "Watanabe"). The Office Action also rejects claims 11, 13, 17, 20, 23, 26 and 29 under 35 U.S.C. §103(a) as allegedly being unpatentable over Watanabe. Applicants respectfully traverse these rejections.

Watanabe discloses a process for the production of an optically active alcohol, wherein a ruthenium complex is used as a catalyst in the presence of a formic acid hydrogen donor and a triethylamine base. Watanabe, 1712, first paragraph. Every hydrogenation process described in Watanabe includes the combined use of the same formic acid hydrogen donor in combination with the triethylamine base (Watanabe, 1714), thereby illustrating the understanding in the art that a base was essential for asymmetric reduction of ketones by a catalyst having a sulfonyl diamine ligand, such as RuCl[(S,S)-Tsdpen](p-cymene), to obtain a catalytically-active species.

The use of formic acid as the hydrogen source requires the existence of a base, i.e., the triethylamine described by Watanabe. Watanabe does not describe a process for the producing an optically active alcohol comprising the use of pressurized hydrogen and without the presence of a base, as recited in claim 11. Therefore, Watanabe does not anticipate claim 11.

Conventionally, it had been thought that existence of a base was essential for asymmetric reduction of ketone by a catalyst having a sulfonyl diamine ligand, such as

$\text{RuCl}[(\text{S,S})\text{-Tsdpen}](\text{p-cymene})$, to obtain a catalytically-active species. When 2-propanol is used as a hydrogen source, the prior art has used a catalyst such as a compound of $\text{RuCl}[(\text{S,S})\text{-Tsdpen}](\text{p-cymene})$ and KOH. Here, KOH is used as a base. Since reactions in 2-propanol produce an optically-active alcohol as well as acetone due to equilibration, reaction efficiency is poor. When formic acid is used as the hydrogen source, while reaction efficiency is improved, the method still requires the existence of a base, which is triethylamine in Watanabe.

In addition, conventionally, it had been thought difficult to use hydrogen gas in an asymmetric reaction of ketone using a compound of $\text{RuCl}[(\text{S,S})\text{-Tsdpen}](\text{p-cymene})$ and a base as a catalyst because of the mechanism of the reaction. In Watanabe, formic acid is used to supply hydrogen.

In the present claims, however, hydrogenation progresses without using a base under pressurized hydrogen, by using the catalyst represented by Formula (1) in claim 11. By using this catalyst system, an optically-active alcohol can be obtained at high yield and with high stereoselectivity. Furthermore, the range of ketones that can be used is widened.

Watanabe requires the use of a base (triethylamine), and thus the process of present claim 11, using a particular catalyst, pressurized hydrogen and no base, would clearly not have been obvious from Watanabe.

The results achieved by the present process are, in fact, quite unexpected from Watanabe.

For example, the process of claim 11 provides greater efficiency for hydrogenation of previously difficult to hydrogenate ketones. Example 47 of the specification as filed describes hydrogenation of 4-chromanone according to the process of claim 11, including the use of pressurized hydrogen and without the presence of a base, and resulted in a 97% enantiomeric excess at a 93% yield. The same hydrogenation attempted according to the

process described in Watanabe resulted in a 97% enantiomeric excess, but only a 37% yield. Takeshi Ohkuma et al., *The Hydrogenation/Transfer Hydrogenation Network: Asymmetric Hydrogenation of Ketones with Chiral n-Arene/N-Tosylethylenediamine-Ruthenium(II) Catalysts*, 128 J. Am. Chem. Soc. 8724, 8725 n. 13 (2006). (A copy of this reference is attached in an Information Disclosure Sheet for the Examiner's information). Again, Watanabe provides no reason or rationale for one having ordinary skill in the art to have attempted the process of hydrogenation comprising use of pressurized hydrogen and without the presence of a base, as recited in claim 11.

For at least the reasons discussed above, Watanabe does not anticipate or render obvious claims 11, 13, 17, 20, 23, 26 and 29. Accordingly, withdrawal of the rejections relying upon Watanabe is respectfully requested.

II. Rejoinder Of Claims

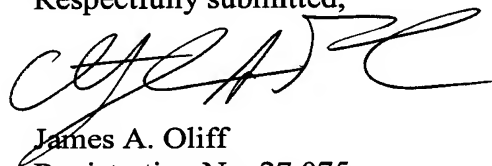
Rejoinder of claims 12, 14-16, 18-19, 21-22, 24-25, 27-28 and 30-31 is respectfully requested.

III. Conclusions

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 11-19 and 21-31 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Date: November 13, 2008

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